

EG&G ROCKY FLATS
ENVIRONMENTAL MANAGEMENT
DEPARTMENT

EM Inspection Report (EMIR)

EMIR No.: 94-051
 Page 1 of 2

ADMIN RECORDED

Project Name: Geotechnical Investigation (to support interim measure/interim remedial action for OU 4)
 Location: piezometer 54494

Activity Description: piezometer installation

Personnel Contacted (include company and title)

Engineering Science - J. Evans (site manager), J. O'Brien (geologist), V. Rothman (health and safety specialist), and D. Burgess (sample manager)

Ground Exploration - G. Huff and D. French (drillers)

No. References (include Revision/Date)

- 1 OU4 Solar Evaporation Pond Interim Measure/Interim Remedial Action, Geotechnical Borehole Work Plan (draft), Rocky Flats Plant, Golden Colorado, July 1994.
- 2 Final Report Health and Safety Plan, Phase I RCRA Facility Investigation/Remedial Investigation Operable Unit No. 4, Rocky Flats Plant, Golden, Colorado, October 1992.
- 3 5-21000-OPS-GT.1, Rev. 2 (5/12/92), Logging Alluvial and Bedrock Material
- 4 5-21000-OPS-GT.2, Rev. 2 (5/12/92), Drilling and Sampling Using Hollow-Stem Auger Techniques
- 5 5-21000-OPS-GT.6, Rev. 2 (5/12/92), Monitoring Well and Piezometer Installation
- 6 5-21000-OPS-FO.3, Rev. 2 (5/12/92), General Equipment Decontamination
- 7 5-21000-OPS-FO.13, Rev. 2 (5/12/92), Containerization, Preserving, Handling, and Shipping of Soil and Water Samples
- 8 5-21000-OPS-FO.15, Rev. 2 (5/12/92), Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs)

DEVIATIONS		DISPOSITION	
DEV #	REF #	ISSUE	DISPOSITION
1	1	the geotechnical work plan is a draft, uncontrolled document	discussed this issue with J. Evans (site manager)
2	2	the health and safety plan is an uncontrolled document	notified J. Evans of this deficiency; see comment #1

[Use Continuation Sheet(s), If Necessary]

Originated By: Michelle S. Hansen

Print Name

Signature

Inspection Date

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EM Inspection Report (EMIR)
Continuation Sheet

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DEVIATIONS		[Use Continuation Sheet(s), If Necessary]
DEV #	REF #	DISPOSITION
3	1	discussed this issue with J. Evans; apparently, the decision to install a piezometer in 1 of the 5 boreholes was made after submittal of the work plan
4	1	discussed this issue with J. Evans who agreed that the workplan should have been revised to reflect the applicable sample handling procedures
5	5	discussed this issue with J. O'Brien (geologist) and G. Huff (driller); see comment #2
6	5	discussed this issue with J. O'Brien; see comment #3

COMMENTS

- 1) According to EG&G Environmental Restoration Document Control, although this health and safety plan is currently uncontrolled, a document modification request (DMR) to control this document was recently submitted and is in progress to begin control of this plan.
- 2) In accordance with reference #5, the use of a mud balance is required to verify that the density of the bentonite grout is at least 9.9 lbs/gallon. Although the grout appeared to be very dense, a mud balance was not used during mixing of the grout.
- 3) Reference #5 requires that the bentonite grout be placed into the annular space using a side-discharge tremie pipe located just above the bentonite seal to ensure that grout is added from the bottom up. A tremie pipe system was not used in grouting this piezometer. Although reference #5 allows mixing the grout by hand for intervals less than 5 feet thick, it does not state that grout can be poured (or shoveled) into the hole, which was done during the installation of this piezometer.

Originated By: Michelle G. Hanson Michelle G. Hanson
 Print Name Signature
1 8/11, 12, 15, 17/94
 Inspection Date

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Check List

Check List No: CL21000-OPS-GT.1

Rev. #5

Effective Date: 12/14/92

Approved: [Signature]

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EMIR No.: 94-051

Prepared: 10/5/92 - 6/21/94

Check List for Procedure - No.: 5-21000-OPS-GT.1, R.2 (5/12/92)

- Title: Logging Alluvial and Bedrock Material

INSPECTION ITEMS

No. Item

1. Qualifications and training
 - 1.1 alluvial sample logger: BS/BA geology; RFP Alluvial Ref. Set and Core Ref. Set
 - 1.2 bedrock sample logger: geologist/geologic engineer; RFP Alluvial and Core Ref. Set
 - 1.3 all staff: OSHA, H&S

2. Labeling, handling and shipping of core/cuttings and boxes
 - 2.1 conducted according to OP FO.13, Contamination, Preserving, Handling and Shipping of Soil and Water Samples
 - 2.2 scanned (haz/rad) core (in sampler) and cuttings samples according to:
 - SOP FO.8, Handling of Drilling Fluids and Cuttings
 - SOP FO.15, Photoionization Detectors (PIDs) & Flame Ion. Det. (FIDS)
 - SOP FO.16, Field Radiological Measurements

- 2.3 core:
 - 2.3.1 while core in sampler:
 - 2.3.1.1 consolidated
 - 2.3.1.2 measured to nearest 0.1 ft
 - 2.3.1.3 etched w/ awl on left & flat-head screwdriver on r. (if competent core)
 - 2.3.2 plastic wrap in core box
 - 2.3.3 wood blocks w/ depth in black waterproof ink at end of each intl.

- 2.4 cuttings:
 - 2.4.1 representative sample taken: every 2 ft. or 5 ft., if appropriate
 - 2.4.2 placed in labeled jar in core box
 - 2.5 label/ID on body and lid of box:
 - 2.5.1 well name
 - 2.5.2 depth interval
 - 2.5.3 date
 - 2.5.4 project #
 - 2.5.5 loggers initials

- 2.5.6 box # and total # of boxes
- 2.5.7 core box closed and secured to prevent shifting of core and cuttings jars
- 2.5.8 rad/NOC field monitoring (box-top only)

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- 2.7
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2.4.7 results written on top of core box
 2.4.7 appropriate haz. waste labels

3/24/94

N/I not inspected

3.1	3.1.1	poten. contaminated core:	removed and segregated by poten. contam. char.	N/A
	3.1.2	placed in designated core boxes		
	3.1.3	core boxes labeled: label		
	3.1.3.1	White 1" low level rad		
	3.1.3.2	ORM-E ¹⁵ other reg. material class E (Vol. or mixed substances)		
	3.1.3.3	SUS RAD ¹⁵ mixed substances		
3.2	3.1.4	core boxes stored in separate facility		
	3.2.1	placed in separate core boxes		
	3.2.2	wood blocks w/interval of core removed and location of sample		
	3.2.3	core boxes stored at main core storage facility		
4.	4.1	Photographing core (optional at field site)	conducted before logging and before sampling	N/I
	4.2	used Kodak color patch		
	4.3	ID tag:		
	4.3.1	well name		
	4.3.2	depth range		
	4.3.3	box # and total # of boxes		
	4.3.4	date core drilled		
	4.3.5	project #		
5.	5.1	Geologic logging of alluvial material and core logging done in field:	Rocky Flats Plant Borehole Log provided on preliminary field log (Form ST-1B) and all sample numbers/depths	
	5.1.1	info. for columns 1-4 completed or back of Borehole Log (Form ST-1A)		
	5.1.2	general lith. desc., moisture content, and depth to water table, on		
	5.1.3	Borehole Log delivered to remote location w/in 1 day of filling box		
	5.2	logging done at other facility:		
	5.2.1	logging alluvial material:		
	5.2.1.1	classification, textural		N/I
	5.2.1.2	color		
	5.2.1.3	grain size (U.S.C.S.):		
	5.2.1.4	grading, sorting		
	5.2.1.5	grain angularity (ASTM D2488)		
	5.2.1.6	plasticity (RFP Alluvial Ref. Set)		
	5.2.1.7	composition		
	5.2.1.8	bedding		
	5.2.1.9	moisture content		
	5.2.1.10	top of bedrock, if present		

By: Michelle G. Johnson Michelle Johnson Signature 8/11, 12, 15, 17/94 Inspection Date

9. Comments:

8.1 Borehole Log (Form GT.1A) 3 day for each borehole (one borehole per form)

8.2 Hollow Stem Auger Drilling held Activities Report (Form GT.2A); completed each day for each borehole (one borehole per form)

8.2 Rotary/Core Drilling Field Activities Report (Form GT.4A); completed each day for each borehole (one borehole per form)

8.2 Preliminary Well-Site Field Log (Form GT.1B) MGT

7.1 sampling equip. deconned according to OP FO.3, Gen. Equip. Decon. MGT

7.2 drilling equip. deconned according to OP FO.4, Heavy Equip. Decon. N/I

6.2.1 sample #

6.2.2 depth

6.2.3 purpose

6.2.4 date

6.2.5 company

6.1 removed after core logged and photographed

6.2 wood block in place of sample, w/ info. in black waterproof permanent marker

5.2.2 logging bedrock:

5.2.2.1 classification, w/ modifiers N/I

5.2.2.2 color (wet; GSA Rock-Color Chart)

5.2.2.3 textural:

5.2.2.4 porosity (20X binocular microscope)

5.2.2.5 relative abundance

5.2.2.6 cement

5.2.2.7 friability

5.2.2.8 composition (accessory minerals, fossils, distinguishing features)

5.2.2.9 bedding and internal structure

5.2.2.10 fractures/slickensides (aperture, angle, fill, displace.)

5.2.2.11 ripple marks, flow structures burrows/tubes, load casts, desiccation cracks

5.2.2.12 moisture content (dry, moist, saturated)

5.2.2.13 depth to top of saturated interval

5.2.2.14 top of bedrock

grain size (ASTM D422, w/230 sieve); Wentworth scale

grading/sorting

grain rounding

5.2.2.4 porosity (20X binocular microscope)

5.2.2.5 relative abundance

5.2.2.6 cement

5.2.2.7 friability

5.2.2.8 composition (accessory minerals, fossils, distinguishing features)

5.2.2.9 bedding and internal structure

5.2.2.10 fractures/slickensides (aperture, angle, fill, displace.)

5.2.2.11 ripple marks, flow structures burrows/tubes, load casts, desiccation cracks

5.2.2.12 moisture content (dry, moist, saturated)

5.2.2.13 depth to top of saturated interval

5.2.2.14 top of bedrock

6.1 removed after core logged and photographed

6.2 wood block in place of sample, w/ info. in black waterproof permanent marker

6.2.1 sample #

6.2.2 depth

6.2.3 purpose

6.2.4 date

6.2.5 company

7.1 sampling equip. deconned according to OP FO.3, Gen. Equip. Decon. MGT

7.2 drilling equip. deconned according to OP FO.4, Heavy Equip. Decon. N/I

8.1 Borehole Log (Form GT.1A) 3 day for each borehole (one borehole per form)

8.2 Hollow Stem Auger Drilling held Activities Report (Form GT.2A); completed each day for each borehole (one borehole per form)

8.2 Rotary/Core Drilling Field Activities Report (Form GT.4A); completed each day for each borehole (one borehole per form)

EM Inspection Report (EMIR) Check List

EMIR No.: 94-051
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 Approved: _____
 Approved Date: _____
 Effective Date: _____

Check List No: CL21000-OPS-GT.2
 Rev. 4
 Prepared: 5/20/94

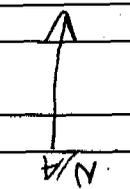
Check List for Procedure - No.: 5-21000-OPS-GT.2, B2 (5/12/92) | DEN 92.09. 92.04
 - Title: Drilling and Sampling Using Hollow-Stem Auger Techniques

No.	Item	Initial If
1.	Qualifications and Training	
1.1	supervisor: BS/BA geology; field experience	MST
1.2	other staff: field experience or on-the-job training	MST
1.3	all staff: OSHA; H&S; training on SOP GT.1, Logging Alluvial and Bedrock Material	MST
2.	General	
2.1	borehole location cleared according to SOP GT.10, Borehole Clearing	N/I
2.2	borehole location identified w/ stake or paint stick on paved surface	MST
2.3	equipment inspected for leaks	MST
2.4	all equipment on plastic sheeting	MST
2.5	exclusion zone established according to project H&S plan	MST
2.6	pure vegetable oil used for drilling/sampling equipment	MST
2.7	noted first indication (time, depth) of free water on samples/samplers	MST
2.8	water levels measured each day before drilling begins and recorded on Form GT.2A	MST
3.	Drilling	
3.1	general:	
3.1.1	borehole depth designated in FSP	MST
3.1.2	embedment for monitoring wells designated in FSP or work plan	--
3.1.3	bedrock sampled: borehole intersects bedrock b/f casing inserted (SOP	N/A
3.1.4	GT.3, Isolating Bedrock from the Alluvium with Grouted Surface Casing)	MST
3.1.5	sample barrels w/permanent welded/stamped I.D.	MST
3.2	methods:	
3.2.1	hollow-stem auger: used for environmental samples, geologic logging, hydraulic or	MST
3.2.2	rock coring:	
3.2.2.1	used to penetrate cemented zone and conducted according to SOP GT.4,	N/A
3.2.2.2	Rotary Drilling and Rock Coring	
3.2.2.3	water as drilling medium: for geologic logging, hydraulic or geotechnical	
3.2.3	testing, monitoring wells	
3.3	water levels measured before drilling	MST

Daily Field Drilling Activities Report
measured, but not counted

N/I not inspected

4.1	4.1.1	general: sampling and types of samplers designated in FSP or work plans.	MGT
	4.1.2	noted moisture changes in samples (time/depth)	MGT
	4.1.3	sample/barrel scanned when opened, per SOP FO.16, Field Rad. Meas.	MGT
4.2	4.2.1	continuous core auger:	
	4.2.1.1	sample increments = 2 ft (unless designated in FSP)	MGT
	4.2.1.2	unlined barrel (except for 3-in stainless steel [SS] VOA sample liner at bottom of barrel, if required)	MGT
	4.2.2.1	drive sampling: collected according to ASTM Design. D 1586. <i>always. which was not successful</i>	MGT
	4.2.2.2	used split spoon, or	MGT
	4.2.2.3	used California sampler	MGT
	4.2.2.4	two turns of rope on cathead or auto. trip hammer	MGT
	4.2.2.5	140-lb hammer assembly attached to top of drill rod	MGT
	4.2.2.6	depth to bottom of sampler recorded	MGT
	4.2.2.7	reference marks placed on drill rod at 6-in increments	MGT
	4.2.2.8	hammer dropped 30 inches	MGT
	4.2.2.9	Kansas type sampler (used to collect soil samples at depth without a drill rig)	MGT
	4.2.3.1	Stanley sinker drill attached to rear, all-terrain vehicle (Scorpion)	MGT
	4.2.3.2	Kansas type sampler attached to probe rods and hydraulically pushed and hammered to top of sampling depth.	MGT
	4.2.3.3	pilot hole drilled to top of sampling depth when depth to first sample interval or depth between samples > 2 feet.	MGT
	4.2.3.4	sample screened as specified in FSP and logged.	MGT
4.3	4.3.1	sample types: composite:	
	4.3.1.1	sampler closed, placed in a safe location out of direct sun until sufficient samples obtained	MGT
	4.3.1.2	sample (consolidated only) peeled w/ SS instrument	MGT
	4.3.1.3	composite sample scraped from peeled sample and placed in SS bowl w/ SS instrument	MGT
	4.3.1.4	placed in appropriate containers	MGT
	4.3.2	geotechnical (peeling not required):	
	4.3.2.1	placed in 3/4-filled pint-sized glass jars w/ airtight lids (or capped liners for samples collected using Kansas-type sampler)	N/A
	4.3.2.2	placed in compartmented shipping cartons	N/A
	4.3.3	VOA:	
	4.3.3.1	sampling: three VOC samples will be collected per borehole:	
		- base of first drive sample w/in bedrock below alluv. mat. in unsaturated	



6.1	completed according to SOP GT.6, Monitoring Well and Piezometer Install.	MGT
6.1.2	location stake remains and board/cover placed over hole until grouted.	MGT
6. Borehole Completion and Abandonment		
5.2.3	samples not collected because recent borehole (within 1 year) located within 10 feet.	N/A
5.2.2	soil samples from top, middle, bottom composited in SS bowl (up to 4 drums from same borehole per composite)	N/A
5.2.1	used bailer for liquid samples from top, middle, bottom	N/A
5.2	geochem. samples from drummed environ. materials:	
5.1	handled per SOP FO.8, Handling of Drilling Fluids and Cuttings	MGT
5. Cuttings and Drilling Fluids:		
4.6	soil/rock samples handled per SOP FO.13, Containerizing, Preserving, Handling and Shipping of Soil and Water Samples	MGT
4.5	geologic logging of samples according to SOP GT.1	MGT
4.4.6	field blanks (w/ preservatives; N/A to VOAs)	N/A
4.4.5.3	glass or SS beaker to dip water from bowl to sample containers	N/A
4.4.5.2	3 L dist. water rinsed over sampler & collected in SS bowl	N/A
4.4.5.1	collected from samplers w/ sample liners b/ sampling equipment rinse blank	N/A
4.4.5	barrel that holds two 3-in SS liners for VOA samples	N/A
4.4.4	obtained vertically adjacent to original samples using specially-designed core duplicate collected (matrix spike, matrix spike duplicate prepared in lab)	N/A
4.4.3	collection of QC sample documented in field log book and Form GT.2A additional VOC samples collected.	N/A
4.4.2	when insufficient sample material is available for planned QC sample, conditions documented in field log book and Form GT.2A.	N/A
4.4.1	collection and frequency according to work plan	N/A
4.4	QA/QC sampling:	
	- placed in plastic bags prior to placement in cooler w/ ice	N/A
	- labeled.	MGT
	- sealed w/ plastic caps.	MGT
	- 3-in long SS sample liner capped w/ Teflon®-paper plastic caps.	N/A
4.3.2	containers:	
	- cut, pulled, wrapped, placed in jar, sealed	N/A
	- scanning, color change, free product, etc., indicated possible contam. other than at targeted VOC sample: 3 in. sect.	N/A
	- base of next drive interval.	N/A
	- if lith. feature or OVA reading indicated anomalous VOC, sampled	N/A
	- bottom of first drive sample below water table (if appl.).	N/A
	- water table (if applicable)	N/A
	- base of every other 2-ft drive sample from surface to conditions	N/A

J. A. Jones doing this same borehole per composite

add'l VOC samples collected.

By:

Print Name

Signature

Inspection Date

Michael G. Johnson, 8/11, 12, 15, 17/94

Blank lines for notes or additional information.

Comments:

- 9.3 information on Form GT.2A entered into Datacap per SOP FO.14, Field Data Management *Field*
- 8.3 for each day for each borehole (one borehole per form)
- 8.2 Hollow-Stem Auger Drilling Field-Daily Field Drilling Activities Report (Form GT.2A); completed
- 8.1 Borehole Log (Form GT.1A)
- 8. Documentation *plant form*
- 7.2 drilling equipment:
 - 7.2.3 deconned drill rig when moved to new work area or becomes very dirty
 - 7.2.2 deconned downhole equip. between boreholes *had string clear augers*
 - 7.2.1 deconned according to SOP FO.4, Heavy Equipment Decon.
- 7.1 decontamination:
 - 7.1.1 deconned according to SOP FO.3, General Equipment Decon.
 - 7.1.2 conducted between individual samples.
 - 7.1.3 deconned equipment placed on new plastic sheeting or racks.
 - 7.1.4 two sets of samplers available.
- 6.2 abandonment:
 - 6.2.3 location stake placed in grout.
 - 6.2.2 grouted on same day of abandonment if depth > 1 ft.
 - 6.2.1 abandoned according to SOP GT.5, Plugging and Abandonment of Boreholes.

Check List for Procedure - No. 5-21000-OPS-GT.6, Rev. 2 (5/12/92) **Title:** Monitoring Well and Piezometer Installation

No.	Item	Initial if Completed
1.	Qualifications and Training: geologists, geotech. engineers, or field techs. w/field experience or supervised OJT	MGT
2.	Equipment and Procedures for Monitoring Well and Piezometer Installation	
2.1	Drilling: Decom. of equipment between areas according to SOP FO.3, Gen. Equip. Decom. SOP FO.4, Heavy Equip. Decom. (no decon of augers between methane wells if no samples taken); 2.1.1.1 downhole equip. between boreholes 2.1.1.2 rig between work areas 2.1.1.2 rig between work areas	MGT
2.1.2	drilling/sampling equipment protected from ground surface by clear plastic sheeting or clean drill racks	MGT
2.1.3	before drilling, drill sites have been marked and cleared (SOP GT.10, Borehole Clearing)	MGT
2.1.4	boreholes for wells drilled according to SOP GT.2, Drilling and Sampling Using Hollow-Stem Auger Techniques or SOP GT.4, Rotary Drilling and Rock Coring	MGT
2.1.5	during drilling, wells logged stratigraphically (SOP GT.1, Logging Alluvial and Bedrock Material)	MGT
2.1.6	if hole is augered (hollow-stem), auger < 1 ft into bedrock (to minimize smearing of clay on borehole wall).	N/A
2.1.7	surface casing that is installed in bedrock wells in areas of potentially contaminated groundwater installed in accordance with SOP GT.3, Isolating Bedrock from the Alluvium with Grouted Surface Casing.	N/A
2.1.8	alluvial wells: 2.1.8.1 drive sampler (where claystone smearing a problem) driven or augered 2 ft into the bedrock to provide a pilot hole for a 2-ft sediment sump (< 1 in. annulus around sump) 2.1.8.2 if center bit required during coring of alluvium, a 1 ft drive sample may be taken after drilling to determine bedrock/alluvium contact 2.1.8.3 record of intervals drilled using center bit noted on log sheet 2.1.8.4 volume of water added to well in case of blowing sands recorded	N/A
2.1.9	> 2 in. annulus provided around well screens and casings: centralizers used in open-hole installation spaced < 20 ft apart, above and below well screen (never within bentonite seal)	N/A
2.1.10	cuttings and formation water handled according to SOP FO.8, Handling of Drilling Fluids and Cuttings	MGT
2.2	Well Materials and Installation Procedures: 2.2.1 well materials: 2.2.1.1 well casings: new threaded flush-joint, 40 PVC unless another casing type is	

11/24

MGT	required by FSP or workplan
MGT	well casing stick-up \geq 2 ft above ground surface; \geq 3 ft for methane wells
MGT	tops fitted with slip-on or threaded PVC caps
MGT	o-rings or PTFE tape wrapped around joint threads
MGT	well casing steam cleaned and stored in plastic sleeves
MGT	prior to use
MGT	2.2.1.2 well screens:
MGT	new threaded PVC pipe (unless another casing type is required by FSP or workplan) with 0.010 in. factory-machined slots or wrapped screen
MGT	1.D. \geq well casing; methane wells = 4 in.
MGT	wall thickness = well casing
MGT	2.2.1.3 2-ft sediment sump at bottom of screened interval (no sump for methane wells)
MGT	2.2.1.4 threaded cap or slip-on cap secured with SS screws provided at bottom of sump or methane well screen
MGT	2.2.1.5 filter pack:
MGT	16-40 silica sand (unless FSP or workplan specifies other) will not extend $>$ 6 in. above screened interval (up to 2 ft if possible)
MGT	methane wells: 3/8 in. washed pea gravel to 1 ft above screen
MGT	the final depth to the top of filter pack measured using weighted tape measure
MGT	Volume placed recorded
MGT	2.2.1.6 bentonite seal
MGT	commercially available pellets or chips (as applicable)
MGT	≥ 2 ft thick as measured immediately after placement
MGT	2.2.1.7 bentonite grout - high-solids reduced-pH (\geq 30% solids by weight w/minimum density of 9.9 lbs/gal as verified using mud balance) extends from bentonite seal to ground surface (if seal is within 3 ft of ground surface, no grout required)
MGT	installation procedures:
MGT	2.2.2.1 if wet - installed after formation water and fine grained sediment bailed until water is relatively clear and free of sediments
MGT	2.2.2.2 measured borehole depth to nearest 0.1 ft
MGT	2.2.2.3 measured well assembly to nearest 0.1 ft
MGT	2.2.2.4 for alluvial wells: bottom of screened interval placed at alluvial/bedrock contact
MGT	2.2.2.5 well strings suspended \sim 2 in. above bottom of borehole prior to installing filter pack for wells installed in open holes drilled using rotary methods; SS centralizers placed \leq 20 ft spacing
MGT	2.2.2.6 after well assembly in place, added filter pack slowly:
MGT	screened interval below water level - tremie pipe used
MGT	screened interval above water level - tremie pipe not required
MGT	all open hole completions - tremie pipe used
MGT	filter pack added in 1-to-2 ft increments, augers raised in 1-to-2 ft increments so that sand level is always at or above the bottom of augers, continuous depth measurements taken with SS-weighted tape measure
MGT	volume of filter pack recorded; volume of distilled water used to dislodge bridged material recorded (as applicable)
MGT	2.2.2.7 \geq 2 ft bentonite seal (before wetting) placed on top of filter pack:

2.2.2

MGT

no mud balance

N/A	top of filter pack below water table - tremie pipe used	
MGT	top of filter pack above water table - pellets allowed to free-fall	
MGT	bentonite seal placed so that top of seal is never above base of augers	
MGT	bentonite hydrated using 5 gal of distilled water after base of augers raised ≥ 1 ft above top of seal; seal allowed to hydrate for ~30 min	
MGT	recorded volume and depth	
MGT	2.2.8 bentonite grout backfill placed on top of bentonite seal to surface:	
MGT	NOTE: no bentonite grout backfill needed for alluvial wells if bentonite seal w/in 3 ft of surface	
MGT	recorded volume	
MGT	before grout hardened, well casing checked for plumb using weighted tape measure, shifted to vertical, if necessary, and held in place while grout hardened	
MGT	allowed grout to set up for 24 to 72 hours	
MGT	2.2.9 methane wells: 3 ft bentonite grout or cement from top of bentonite grout backfill to surface	
N/A	2.3.1 protective steel casing installation (not required for methane wells): checked well alignment using a 5 ft long, 1 1/2 in. diameter baller	
N/A	2.3.2 3 to 5-ft protective steel casing w/ a hinged and locking steel cap: ≥ 8 -in. ID for 4-in. wells and ≥ 6 -in. ID for 2-in. wells	
MGT	2.3.3 installed w/in 24 to 72 hours after grout placement to a depth of 1.5-3 ft below ground surface (removed excess bent. grout backfill, if necessary); allowed ≥ 2 -in. clearance between top of well casing and cap on protective casing	
MGT	2.3.4 if upper grout backfill surface dehydrated: removed or rehydrated for 30 min annulus between well casing and protective steel casing filled with nonshrink cement-bentonite grout or concrete to a minimum of 12 in. above ground surface	
MGT	2.3.5 1/4-in. diameter hole drilled in protective casing just above grout or concrete surface to allow for drainage	
N/I	2.3.6 well designation welded on protective casing	
MGT	2.3.7 surface casing optional for bedrock well; if used, casing extends ≥ 3 ft below alluvium/bedrock contact	
N/A	2.4 well features at ground surface:	
MGT	2.4.1 hinged and locking steel cap on concrete square (3 ft on each side and ≥ 5.5 in. thick) pad with top surface sloping away from casing constructed, with well designation inscribed in concrete	
MGT	2.4.2 if conditions warrant extra protection (i.e., heavy traffic), four 3-in. dia. protective steel posts installed within 72 hours of well installation with following features: embedded in concrete to depth of 3 ft with ≥ 3 ft stick-up, located 4 ft radially from protective casing	
MGT	2.4.3 in areas of high vegetation, posts flagged	
N/A	Documentation	
3.1	3.1.1 administrative documentation preceding well installation	
MGT	3.1.2 completed Well Installation Notification Form (Form GT.6A)	
MGT	3.1.2 necessary information submitted to EG&G subcontractor to apply for Colorado well permits	
MGT	3.1.3 received notice from EG&G Geosciences Div. that well permits have been approved by state	
MGT	3.1.4 obtained soil disturbance permit from RFP construction Mgmt.	
MGT	3.2 Borehole Log (Form GT.1A)	
MGT	3.3 Daily Field Drilling Activities Report Form (Form GT.2A)	
MGT	3.4 Groundwater Monitoring Well and Piezometer Report (Form GT.6A)	

Roady Pkts

only 2 needed

Concrete handons hole will be drilled after

14 7/1

No.	Item	Initial if Completed
1.	Qualifications and Training	MGT
1.1	appropriate site-specific H&S documentation and training	MGT
1.2	complete understanding of SOP FO.3, General Equipment Decontamination, with specific training as necessary	MGT
2.	General	
2.1	phosphate-free detergent (e.g., Liquinox) used	MGT
2.2	brushes not wire-wrapped type	MGT
2.3	solvents, nitric acid solns., detergent & rinse water used to decon. not reused.	MGT
2.4	contaminated equipment/containers not stored w/ clean equipment	MGT
2.5	unused equipment taken to field recleaned before replaced in storage (if taken to site where contamination or suspected contamination was present)	MGT
2.6	precleaned equipment/containers stored separately from other equipment/supplies	MGT
2.7	RFP drinking water used as tap water (can substitute higher grade water such as distilled)	MGT
2.8	exterior of filled sample containers decontaminated	MGT
2.9	solvents used for cleaning other than those in SOP justified and approved by EG&G and documented in logbook	N/A
2.10	all materials disposed according to SOP FO.10, Receiving, Labeling, and Handling Environmental Materials Containers.	MGT
3.	Teflon® and Glass Sampling Equipment	
3.1	rinsed w/ tap water in field if not decontaminated immediately	N/A
3.2	steam cleaned if used for oil, grease, other hard-to-remove materials	
3.3	washed w/ lab detergent & tap water using brush	
3.4	rinsed w/ tap water	
3.5	rinsed w/ distilled water	
3.6	discarded if not clean after decon.	
3.7	wrapped in plastic	
4.	Stainless Steel and Metal Sampling Equipment	
4.1	rinsed w/ tap water in field if not decontaminated immediately	N/A
4.1.1	in extreme cases, steam cleaned or sandblasted if used for oil, grease, other hard-to-remove materials	
4.1.2	scraped & steam cleaned if grossly contaminated	
4.1.3	washed w/ lab detergent & tap water using brush	
4.1.4	rinsed w/ tap water	

Check List for Procedure - No.: 5-21000-OPS-FO.3, R2 (5/12/92) - Title: General Equipment Decontamination

EMIR Inspection Report (EMIR) Check List

Check List No: CL21000-OPS-FO.3

Rev. 2

Prepared: 5/24/94

Approved: _____

Approved Date: _____

Effective Date: _____

Page _____ of _____

EMIR No.: 94-051

EG&G ROCKY MOUNTAINS

ENVIRONMENTAL MANAGEMENT DEPARTMENT

6.1	Sample Tubing	6.1.1 silastic rubber pump tubing and Teflon® sample tubing (cleaned before using): 6.1.2 new tubing for each sampler set-up/sampling point 6.1.3 exterior scrubbed w/ lab detergent & tap water 6.1.4 rinsed w/ tap water by spraying 6.1.5 triple rinsed w/ distilled water by submerging or spraying 6.1.6 lab detergent & water solution pumped/poured through tubing 6.1.7 10 volumes distilled water pumped through tubing	N/A
5.4	bottle siphons for transferring sample from composite container:	5.4.1 used new siphon for each sampling location 5.4.2 used new 3/8-inch Teflon® for organic compound analysis 5.4.3 siphon and tubing flushed w/ sample before use	
5.3	reusable glass/plastic composite sample containers and sequential sample bottles:	5.3.1 glass containers used to collect in-process decon water samples at industrial facilities discarded 5.3.2 scrubbed w/ lab detergent & tap water 5.3.3 rinsed w/ tap water 5.3.4 scrubbed w/ lab detergent & tap water 5.3.5 rinsed w/ tap water 5.3.6 triple rinsed w/ distilled water 5.3.7 dried inverted on rack in clean room (as applicable) 5.3.8 discarded if still not clean in accordance w/ SOP FO10/Receiving, Labeling, and Handling Environmental Materials Containers 5.3.9 sequential sample bottles only: 5.3.9.1 replaced in covered sampler base, covered w/ plastic for storage 5.3.9.2 marked "Cleaned for Organic Analyses" if applicable	
5.2	automatic sampler headers:	5.2.1 header disassembled, cleaned w/ lab detergent & tap water w/ bottle brush 5.2.2 rinsed w/ distilled water 5.2.3 header reassembled, air dried & plastic wrapped 5.2.4 reusable glass/plastic composite sample containers and sequential sample bottles:	
5.1	Decontamination of Automatic Water Sampling Equipment	5.1.1 exterior & accessible interior parts washed w/ lab detergent & rinsed w/ tap water 5.1.2 face of timing case cleaned w/ clean, damp cloth 5.1.3 silastic tubing discarded after use 5.1.4 only glass, Teflon®, or disposable silastic material used to collect liquid samples for metals and/or organic compound analyses	
4.2	gross contamination scraped off in exclusion zone, washed w/ lab detergent and distilled water, using brush outside exclusion zone, double rinsed w/ distilled water, wrapped in plastic or reused immediately.	4.2.1 gross contamination scraped off in exclusion zone 4.2.2 washed w/ lab detergent and distilled water, using brush outside exclusion zone 4.2.3 double rinsed w/ distilled water 4.2.4 wrapped in plastic or reused immediately	MGT MGT MGT MGT
	rinsed w/ distilled water, discarded if not clean after decon, wrapped in plastic, without steam:	4.1.6 rinsed w/ distilled water 4.1.7 discarded if not clean after decon 4.1.8 wrapped in plastic	N/A

Superscript should be smaller

N/I not inspected

6.2	stainless steel tubing:	6.2.1	rinsed w/tap water in field if not decontaminated immediately	N/A
		6.2.2	washed w/lab detergent & tap water w/bottle brush	
		6.2.3	rinsed w/ tap water	
		6.2.4	rinsed w/ distilled water	
		6.2.5	wrapped w/ plastic	
6.3	glass tubing (cleaned before using):	6.3.1	new tubing for each sampler set-up/sampling point	
		6.3.2	rinsed w/ distilled water	
		6.3.3	air dried	
		6.3.4	wrapped in plastic	
		6.3.5	discarded after use	
7.	Well Sounders or Tapes Used to Measure Groundwater Levels	7.1	cleaned in field.	N/A
		7.2	washed w/ lab detergent & tap water.	
		7.3	rinsed w/ distilled water	
		7.4	wrapped in plastic	
8.	Submersible Pumps & Hoses Used to Purge Groundwater	8.1	external surfaces scrubbed w/ phosphate-free lab detergent and tap water.	N/A
		8.2	rinsed w/ tap water by submerging or spraying.	
		8.3	triple rinsed w/ distilled water	
		8.4	phosphate-free lab detergent/water solution pumped through equipment	
		8.5	distilled water (10 volumes of pump capacity) pumped through immediately.	
9.	Field Analytical Equipment and Instrumentation	9.1	sealed watertight equipment: exterior washed w/lab detergent & rinsed w/ tap water; interior wiped w/damp cloth as necessary; equipment dried before storage.	N/A
		9.2	other equipment: wiped with clean, damp cloth.	
		9.3	pH probes, conductivity probes, DO probes: rinsed w/ distilled water before storage	
		9.4	flow measuring equipment: cleaned w/ tap water between measuring locations	
		9.5	dessicant (if present) checked & replaced as necessary	
		9.6	water quality sampling equipment used to collect background samples cleaned w/distilled water between sampling locations using brush; flushed w/ambient water at next sampling location prior to sampling	
10.	Ice Chests and Shipping Containers	10.1	steam cleaned inside & out at MDF.	N/I
		10.2	discarded if contamination remains in accordance w/SOP F0.10- Receiving, Handling, and Labeling Environmental Materials Containers.	
11.	Uncontaminated and Potentially Contaminated Drums (at MDF)	11.1	general:	
		11.1.1	drums emptied, residual contaminants scraped or shoveled out.	N/I
		11.1.2	drums placed in wash rack, open end down	
		11.1.3	decon. operators stood upwind/crosswind	
		11.2	general decontamination:	
		11.2.1	steam cleaned all surfaces, lid, locking ring, bottom, interior.	

By: Michelle Grafton Print Name
Michelle Grafton Signature
8/11, 12, 15, 17/93 Inspection Date

14.	Comments:	
13.	Documentation	13.1 Equipment Decontamination/Wash Checklist and Record (Form FO.3A) <u>WRT</u>
12.	Quality Control Samples	12.1 each time equipment is decontaminated, 10% sampling frequency over length of project. <u>Sketch samples only</u> 12.2 distilled water poured over decontaminated equipment. <u>N/A</u> 12.3 rinse water captured directly in sample bottle (if funnel needed: glass or Teflon®) <u>N/A</u>
11.3	surface radioactively contaminated drums:	11.2.2 drum placed top-down in clean area until dry. <u>N/A</u> 11.2.3 top & locking ring replaced 11.2.4 drum returned to Eg&G. 11.3 all exterior surfaces steam cleaned including bottom. 11.3.1 drum removed to clean area and dried. 11.3.2 drum monitored for rad. contamination. 11.3.3 decontamination procedure repeated if rad. contamination still present. 11.3.4 returned to drum storage area if rad. free, as verified by Rad. Eng. - approved HSS

Check List for Procedure - No.: 5-2100-OPS-F0.13, R2 (5/12/92)
Title: Containerization, Preserving, Handling and Shipping of Soil and Water Samples

No.	Item	Initial
1.	Qualifications: site-specific H&S: 2-yr science degree/education ^{min.} training	MGT
2.	Sample containers certified clean by the manufacturer/analytical lab	MGT
3.	Labels	
3.1	activity name/#	MGT
3.2	unique sample ID	MGT
3.3	preservative	MGT
3.4	sample type (grab/composite)	MGT
3.5	time/date (complete in field by sampler; use time/date of final aliquot for composite samples)	MGT
3.6	analyses required	MGT
3.7	filtered/unfiltered	MGT
3.8	sampler initials	MGT
3.9	comments/special precautions	N/A
3.10	custody seals	MGT
3.11	black, indelible ink	MGT
3.12	if necessary, clear tape placed over labels	N/A
4.	Containers	
4.1	exterior decontaminated after sample emplacement in accordance w/ SOP F0.3	MGT
4.2	bagged	MGT
4.3	coolers (4°C, w/ice); initial check with thermometer	MGT
5.	On site general lab contacted before rad screens shipped & sample categorization	
6.	NOTES: 1. Rad screen procedure determines analytical lab based on: > or = 50 pCi/L water matrix > or = 50 pCi/g soil matrix Low concentration levels: < 10 ppm (contaminant of highest concentration) Medium concentration levels: 10-150,000 ppm High concentration levels: > 150,000 ppm (drum and tanks) at least 1 contaminant If samples reflect evidence of tampering: E&G notified immediately	N/A

INSPECTION ITEMS

(A) See attached
 N/I not inspected

Print Name	Signature	Inspection Date
Michelle B. Hanson	<i>Michelle B. Hanson</i>	8/11, 12, 15, 17/94

No. IFS	Description	Response
7.	Shipping (general) placed	MGT
7.1	plastic liner in cooler	MGT
7.2	~3 inches vermiculite in cooler (bottom)	MGT
7.3	glass containers in bubble pack	N/A
7.4	verify that all samples have reported estimated radiation levels	MGT
7.5	samples upright (except VOC containers)	MGT
7.6	3/4 full of vermiculite	MGT
7.7	VOC vials in center, top of cooler	MGT
7.8	additional layer of vermiculite with ice (blue) on top (blue ice bagged)	N/A
7.9	COCs in plastic bag	MGT
7.10	tap cooler drain shut; strapping tape around cooler in 2 locations	MGT
7.11	airbill/manifest/this side up/"fragile"/"1" / "environmental samples" on cooler	MGT
7.12	7.14.1 "heavy weight" if > 75lbs	N/A
7.13	7.14.2 custody seals (2), signed and dated	MGT
8.	Shipping (medium and high level concentrations)	N/A
8.1	sample container in clear plastic bag	N/A
8.2	sample in metal paint can	N/A
8.3	label paint can with sample ID	N/A
8.4	plastic or metal ice chest used for shipment	N/A
9.	Holding times (Tables A-1 and A-2)	N/A
10.	Documentation - (Chain of Custody [COC] Form)	MGT
10.1	initiated by sampling team; sign and dated	MGT
10.2	relinquish to sample manager to ensure that labels/COCs and error-free	MGT
10.3	form used has ≥ minimum information	MGT
10.4	original and yellow copy to lab w/samples (placed in plastic bag to inside of cooler lid)	MGT
10.5	photocopy and pink copy remain at on-site facility	MGT
10.6	yellow and pink later matched and filed to complete COC	MGT
10.7	golden copy for E&G mgrs; requesting copies	MGT
10.8	original data forms bound and submitted w/transmittal form @ end of task	MGT
11.	Comments:	
	8.9 paperwork taped, w/ waste bags under cooler lid	MGT
	8.10 cooler sealed w/ muslin bag seal	MGT

(B)

10.9

COC form included following:

10.9.1 unique sample number and sample location

10.9.2 project number

10.9.3 date and time of sample collection

10.9.4 signature of collector or field custodian

MGT

MGT

MGT

MGT

10.8

Xerox copy and goldenrod (or blue) copy matched by RFDs to complete coc procedure

N/I

10.7

Xeroxed copy sent to RFDs from lab upon receipt of samples

N/I

10.6

fourth (goldenrod or blue) accompanied data disk deliverable to RFDs

N/I

(A)

6.1 cooler checked to verify temp. for

6.2 personnel w/access to cooler asked about

inadvertent tampering

6.3 every sample container checked for

signs of tampering (i.e., loose lids, foreign

objects, breakage, leakage

6.4 ensured appropriate and adequate packaging

6.5 findings documented in sample managers

field log book

6.6 if malicious tampering is suspected and/or

sample integrity appears compromised, notified

immediately

6.7 if sample integrity does not appear to

be compromised, proceed w/standards procedures

N/A

MGT	10.9.6	Sample matrix
N/A	10.9.7	condition of sample on receipt at lab
MGT	10.9.8	doc control number and date
MGT	10.9.9	signature blocks for personnel relinquishing or receiving sample custody
MGT	10.9.10	name and phone of emergency contact person
MGT	10.9.11	analyses requested
N/A	10.9.12	out of spec reporting

(B) cont.

11. Documentation - Field Data

- 11.1 field descriptions, measurements and observations recorded on appropriate field data forms or logbooks
- 11.2 original data forms collected and filed on site by data entry personnel
- 11.3 data forms bound and submitted to E26 at end of task
- 11.4 field data filed out at time sample is collected
- 11.5 field data will include, but not be limited to:

- 11.5.1 Sampling activity name and number
- 11.5.2 Sampling point name and number
- 11.5.3 sample number
- 11.5.4 name(s) of collectors and others present
- 11.5.5 date and time of sample collection

- for composite samples, time and date of final aliquot recorded in RFDs; sample log form or field logbook included times and dates for start and end times of composite period

- 11.5.6 Sample container tag/label number (if appropriate)
- 11.5.7 preservative(s) used
- 11.5.8 requested analyses
- 11.5.9 sample matrix
- 11.5.10 filtered/unfiltered
- 11.5.11 designation of QC samples (only for MS and MSD)
- 11.5.12 collection methods
- 11.5.13 QC control numbers
- 11.5.14 field observations and measurements during sampling
- 11.5.15 signature of responsible observer

①

7.1 designated lab notified prior to shipment
if samples contain substances requiring add'l
safety precautions

N/A

7.2 containers ^{radiologically} cleared prior to shipment off site

MGT

7.3 property pass obtained and signed by
Construction Management Coordinator and
Radiation Site Survey Officer / or subcontractor

MGT

rad. monitor to ship coolers

EM Inspection Report (EMIR) Check List

Check List No: CL21000-OPS-F0.15

Rev. #2

Prepared: 8/5/92 7/18/94

EMIR No.: 94-051
 Page _____ of _____
 Approved: *[Signature]*
 Approved Date: 8/30/92
 Effective Date: 9/13/92

Check List for Procedure - No.: 5-21000-OPS-F0.15, R2 (5/11/92)

Title: Photoionization Detectors and Flame Ionization Detectors (FIDs)

By: Michelle Esterson
 Print Name
Michelle Esterson
 Signature
 Inspection Date: 8/15/94
 11/12

INSPECTION ITEMS

No.	Item	Initial	Completed
1.	Qualifications and Training: staff using PIDs/FIDs have training & are qualified by SSO	MGT	Completed
2.	General		
2.1	monitoring using PIDs/FIDs at frequency specified in site HASP or SOPs	MGT	
2.2	correct instrument (e.g., FID or PID) being used (based on HASP) or SOPs	MGT	
2.3	correct lamp being used in PID (based on HASP)	MGT	
3.	Calibration and Operational Checks		
3.1	daily calibrations performed:		
3.1.1	prior to use	MGT	
3.1.2	checked at end of day	MGT	
3.2	periodic operational checks performed (e.g., using Magic Marker)	MGT	
4.	Decontamination		
4.1	PIDs/FIDs in plastic bags during use, probe exposed	MGT	
4.2	plastic bag discarded during decon.	MGT	
4.3	instrument surfaces wiped prior to return to equipment manager	MGT	
4.4	equipment deconned. according to OP F0.3 (General Equipment Decon.)	MGT	
5.	Documentation		
5.1	observations & calculations documented in bound, water-proof field notebook by field personnel (entries signed & dated)	MGT	
5.2	observations entered into site mgr's daily logbook by field personnel (entries signed & dated)	MGT	
5.3	Calibration Record (Form FO.15A)	MGT	
5.4	instrument manufacturer's operating manual on site at all times	MGT	
6.	Comments:		

11/24